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10/743,151

12/23/2003

Naoki Makita

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04/19/2006

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EXAMINER

BOOTH, RICHARD A

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 04/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/743,151

Applicant(s)

MAKITA, NAOKI

Examiner

Richard A. Booth

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2006.
 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-52 and 62-67 is/are pending in the application.
 4a) Of the above claim(s) 27, 28, 34, 43, 45, 48, 50-52 and 68-69 is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☒ Claim(s) 22-26, 29-33, 35-42, 44, 46, 47, 49 and 62-66 is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____.
 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) ☐ Notice of Informal Patent Application (PTO-152)
 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 22-26, 29-33, 35-42, 44, 46-47, 49, 62-63, and 65-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al., U.S. Patent 6,251,712 in view of Makita et al., US 2005/0170573.

Tanaka et al. shows the invention as claimed including a method for fabricating a semiconductor device, comprising the steps of: providing an amorphous semiconductor film including a catalyst element of nickel in at least a portion thereof, the catalyst element being capable of promoting crystallization of the amorphous semiconductor film (see col. 4-lines 16-20); performing a first heat treatment on the amorphous semiconductor film so as to crystallize at least a portion of the amorphous semiconductor film, thereby obtaining a crystalline region (see col. 4-lines 21-25); patterning the semiconductor film to form an island-shaped semiconductor layer including the crystalline region (see col. 4-lines 55-61); forming a gate insulating film 106 on the island-shaped semiconductor layer; selectively thinning or selectively removing a portion of the gate insulating film that is located outside a region of the island-shaped semiconductor layer where a channel region, a source region and a drain

region are formed (see fig. 4E); forming a gettering region capable of attracting the catalyst element in a region where the gate insulating film on the island-shaped semiconductor layer has been thinned or removed (see figs. 4E-4F); simultaneously doping the crystalline region of the island-shaped semiconductor layer with an impurity for forming the source region and the drain region (423,424,425,426); and performing a second heat treatment by laser so as to move at least a portion of the catalyst element in the island-shaped semiconductor layer to the gettering region (see fig. 4G).

Tanaka et al. does not expressly disclose forming a gettering region outside the region of the island-shaped semiconductor layer where the channel region, the source region, and the drain region are formed. Makita et al. discloses forming a gettering region (417n, 418n) outside the region of the island-shaped semiconductor layer where the channel region, the source region, and the drain region are formed (see fig. 5F and paragraphs 0149-0160). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Tanaka et al. modified by Makita et al. so as to form the claimed gettering region because in such a way a highly efficient gettering region can be formed.

With respect to claim 23, note that the implantation of the gettering elements in Tanaka et al. will form an amorphous region in the island layer.

Concerning claim 25, note that both n and p type dopants are implanted in Tanaka et al. prior to the second heat treatment.

Regarding claim 31, note that the gettering regions (417,418,428,429) in Tanaka et al. are at a higher concentration than the source and drain regions.

With respect to claims 32-33, the gettering elements in Tanaka et al. are boron and phosphorous.

Concerning claim 39, after the second heat treatment in Tanaka et al. a line 435 is formed in contact with the source or drain regions.

With respect to claims 35, 44, 46, and 62, Tanaka et al. and Makita et al. are applied as above but do not expressly disclose particular concentrations and particular sequences of processing steps. However, a prima facie case of obviousness exists because the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, and with respect to the concentration, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al., U.S. Patent 6,251,712 in view of Makita et al., US 2005/0170573 as applied to claims 22-26, 29-33, 35-42, 44, 46-47, 49, 62-63, and 65-66 above, and further in view of Zhang et al., U.S. Patent 5,481,121.

Tanaka et al. and Makita et al. are applied as above but does not expressly disclose wherein the catalyst element is selectively doped using a mask.

Zhang et al. discloses selective adding nickel to a region 100 using a mask 103 (see figs. 2A-2B and their description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify

the process of Tanaka et al. modified by Makita et al. so as to add the catalyst element selectively as suggested by Zhang et al. because this allows for greater controllability with respect to the crystallization of the semiconductor film.

Response to Arguments

Applicant's arguments with respect to claims 22-26, 29-33, 35-42, 44, 46, 47, 49, and 62-66 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard A. Booth
Primary Examiner
Art Unit 2812

April 5, 2006